



## Environmental Resources Management, inc.

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3 February 1989

Ms. Janet Feldstein  
U.S. Environmental Protection Agency  
Region II  
Emergency and Remedial Response Division  
Room 737  
26 Federal Plaza  
New York, NY 10278

File No: 802-01-01-01

Dear Janet:

Enclosed for your review is the Interim Status Report on Phase I of the Feasibility Study/First Operable Unit for the SCP/Carlstadt Site. Four additional copies are included for your use. The Interim Status Report dated 3 February 1989, supersedes the Draft Interim Status Report dated 13 January 1989.

If you have any questions/comments, please contact me at (215) 5243521. Thank you.

Sincerely,

Marian E. Donovan Carlin  
Project Manager

MEDC/sw

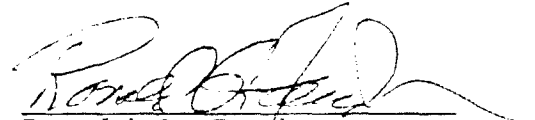
Enclosures


cc: Pam Lange (3 enclosed)  
Harry Yeh (2 enclosed)  
Gil Weil (enclosed)  
Ron Fender (enclosed)  
Bill Warren  
Susan Hoffman (enclosed)

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INTERIM STATUS REPORT OF PHASE I  
FEASIBILITY STUDY FOR  
FIRST OPERABLE UNIT  
SCIENTIFIC CHEMICAL  
PROCESSING SITE  
CARLSTADT, NEW JERSEY

3 February 1989

  
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## SECTION 1

### INTRODUCTION

#### 1.1 Purpose and Scope of Interim Status Report

This Interim Status Report summarizes the current Phase I of the Feasibility Study for the First Operable Unit (FS/FOU) for the Scientific Chemical Processing (SCP) site in Carlstadt, New Jersey. This Interim Status Report provides the highlights of the Phase I activities completed to-date including the identification, evaluation and screening of remedial technologies (Task I), and the development of source control alternatives (Task II). The information presented in this Interim Status Report for Phase I is preliminary and subject to change over the course of completion of the FS/FOU.

The format of the FS/FOU follows the guidelines as stated in the EPA September 1988 Interim Final Report "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA".

#### 1.2 Summary of Dames & Moore Remedial Investigation Report

Background information regarding on-site history, waste characteristics, and hydrogeologic conditions, is derived from previous site work by Dames and Moore or its subcontractors will be summarized as part of the FS/FOU.

#### 1.3 Summary of the TERRA Public Health Assessment

A summary of conclusions reported by TERRA on potential exposure risks associated with the First Operable Unit for the SCP Site will be included in the FS/FOU.

## SECTION 2

### PHASE I DEVELOPMENT OF SOURCE CONTROL ALTERNATIVES

#### 2.1 Introduction

The FS/FOU is a progressive screening process occurring in three phases: the development of alternatives, the screening of the alternatives, and detailed analysis of alternatives.

The basic methodology of the Phase I screening involves elimination of remedial technologies in an orderly fashion. Phase I of the FS/FOU consists of five steps. The five steps of this preliminary screening are:

1. Development of remedial action objectives;
2. Development of general response actions;
3. Identification and screening of technology types and technology process options applicable to each general response action;
4. Detailed screening of technology process options; and
5. Correlation of feasible technology process options into alternatives.

The first step is the development of appropriate remedial action objectives, consisting of medium-specific goals to protect human health and the environment. Remedial action objectives specify the contaminants of concern, potential exposure routes and receptors, and acceptable contaminant levels or ranges of levels for each potential exposure route.

Development of appropriate general response actions involves either the identification of measures that could provide a remedy or involves measures that could be incorporated into a coordinated remedy without identifying specific technologies. General response actions describe those actions which will satisfy the remedial action objectives. They are broadly defined measures designed to prevent or minimize the impact of contaminants which have migrated into environmental media. The selection of potentially applicable response actions is based on data developed during past investigations on site conditions, waste characteristics, and migration pathways.

Based upon the selection of appropriate general response actions, the next step in Phase I is the identification and screening of technology types and technology process options applicable to each general response action. Technology types are general categories of technologies, such as biological treatment. Technology process options are specific processes within a technology type (e.g., rotating biological contactors). During this step, technology types and technology process options are screened for technical implementability. Technology types and technology process options which are clearly precluded by site or waste characteristics of specific media are eliminated during this screening step.

In the fourth step of Phase I, the technology process options considered to be implementable are evaluated using the criteria of effectiveness, implementability, and cost. Feasible process options which are not eliminated in this screening step will be assembled into proposed remedial alternatives (step 5) for subsequent evaluation in Phases II and III of the FS/FOU.

## **2.2 Development of Remedial Action Objectives**

Remedial Action objectives will be based in part on Federal and State ARARs and criteria to be considered (TBCs), including risk - based criteria, background level criteria, and criteria based on analytical detection limits, which are pertinent to the aspects of the site addressed in the FS/FOU.

To develop remedial action objectives, information from pertinent site documents (i.e., TERRA's 1988 Public Health Assessment Report, Dames and Moore 19 September 1988 Remedial Investigation Report) will be reviewed.

## **2.3 Development of General Response Actions**

The following general response actions are considered appropriate for the First Operable Unit at the SCP site:

<u>Remedial Response Action</u>	<u>Media of Concern</u>		
	<u>Sludges</u>	<u>Surface Soil</u>	<u>Shallow Ground Water</u>
- No Action	x	x	x
- Containment	x	x	x
- Shallow Ground Water Collection	N/A	x	x
- Diversion	N/A	x	N/A
- Removal	x	x	N/A
- Treatment	x	x	x
- Disposal	x	x	N/A

(N/A = Not Applicable)

## 2.4 Identification and Screening of Technology Types and Technology Process Options

After selecting appropriate general response actions, potential remedial technology types and process options for each of the three media in the first operable unit (sludge, surficial soil, shallow ground water) are identified based on previous experience with other sites, published literature on conventional and innovative alternative technologies, and the USEPA Handbook of Remedial Action at Waste Disposal Sites (Revised 1985).

As described in USEPA's RI/FS Guidance Document (September 1988), the technology types are subdivisions of the general response actions which could be applied for a remedial response. Most technology types however, are further subdivided into specific technology process options. Each process option included in a given technology type would accomplish similar remediation. For example, capping is a technology type under the containment general response action, but there are several types of caps. The various types of caps are process options. This procedure permits a complete and logical screening of remedial alternatives for the SCP site which will be described in detail in the FS/FOU Report. Technology types and process options, summarized in Table 1, were categorized under appropriate general response actions which apply to the specific site media.

The USEPA RI/FS Guidance Document (September 1988) provides a basic framework, and establishes criteria to facilitate the prescreening process following the identification of technology types and process options.

The third step of Phase I is site-specific, using information provided in the Dames and Moore RI Report to eliminate process options and technology types from further consideration on the basis of technical implementability. Table 2 presents the results of the initial screening of technologies and process options.

## 2.5 Detailed Screening of Technology Process Options

In the fourth step of the Phase I preliminary screening, the technology process options considered to be technically implementable will be evaluated in greater detail. The process options are each being evaluated using the same criteria - effectiveness, implementability, and cost. For this screening step, these criteria are applied only to technologies and the general response actions for the First Operable Unit. The evaluation focuses more on the effectiveness criterion, with less emphasis on ability to be implemented and cost criteria. The aforementioned criteria are defined as follows:

- Effectiveness: The evaluation of this criterion focuses on how each technology protects human health and/or the environment on a short-term and long-term basis. In addition, the ability of the technology to reduce the contaminants of concern to established remediation goals as specified by the remedial action objectives and the proven performance and availability of the technology will be evaluated.
- Ability for implementation: This criterion considers the technical and institutional feasibility of implementing the technology at the site. Greater emphasis will be placed on the institutional aspects such as the availability of necessary equipment and obtaining the required permits to implement a technology.
- Cost: This criterion is used in a qualitative aspect. Detailed cost estimates are not generated for each technology, rather, relative costs (capital and O&M) are used for comparing technologies which achieve the same remediation objective. The cost criterion plays a limited role in screening technologies at this stage.

The comparison of effectiveness, implementability, and cost screening criteria for the various process options which passed the technical implementation screening is summarized in Table 3.

#### **2.5.1 Discussion of Retained Technology Process Options**

The "no action" alternative remains for baseline comparison. This alternative would consist of ground water monitoring only. Under the "containment" general response action, multi-media capping and slurry walls remain as appropriate actions which would most likely be paired with another remedial action. Extraction wells and subsurface drains are retained under the "shallow ground water collection" general response action as feasible technologies for collection of the shallow ground water. Grading and revegetation (under the "diversion" general response action) may be applicable for controlling precipitation run-on and run-off over the surface of the site, while dikes or berms may be appropriate to prevent Peach Island Creek from flooding and eroding the surficial soils at the site.

Because the sewers along Gotham Parkway and Paterson Plank Road may influence the ground water flow pattern of the shallow ground water aquifer, repair or relocation of these sewer lines may be appropriate. Thus the "removal and replacement, relocation or relining of sewer lines" process option is retained under the "removal" general response action. In addition, "complete or partial removal of soils/sludges" is retained, as this process option may be appropriate for all treatment options except in

situ. Several treatment technologies (suspended growth biological treatment, precipitation, neutralization, chemical oxidation, critical fluid extraction, granular activated carbon, local POTW and steam stripping) are retained under the "treatment-shallow ground water" general response action due to the complexity of the ground water matrix which may require more than one treatment technology for remediation.

Solvent extraction, solidification/stabilization (cementitious, pozzolanic and proprietary), rotary kiln incineration, and vitrification process options are retained for evaluation under the "treatment-soil/sludge" general response action. Again, the complexity of the soil/sludge constituent matrix may require more than one treatment technology for remediation. Off-site disposal of the soil/sludge is a viable option under the "disposal" general response action, possibly with prior treatment of the soil/sludge. Disposal of soil/sludge (except those containing with PCBs) in a vault is a viable option, as well.

## **2.6 Development of Potential Remedial Alternatives**

The process options for contaminated soil/sludge and shallow ground water retained from the screening steps above and are grouped into potential remedial action alternatives for each medium. The process options include all technologies listed thereunder. Potential remedial alternatives under consideration for the media are summarized as follows:

### **Contaminated Shallow Ground Water**

#### **Alternative GW-1:**

- No Action.

#### **Alternative GW-2:**

- Pumping (either recovery wells or French interceptor drains),
- Chemical oxidation,
- Biological treatment (sequencing batch reactors with treatment/disposal of sludge),
- Granular activated carbon, and
- Surface water (Peach Island Creek) discharge.

#### **Alternative GW-3:**

- Pumping (either recovery wells or French interceptor drains),



- Chemical oxidation,
- Granular activated carbon,
- Metals precipitation (treatment/disposal of sludge),
- Neutralization, and
- Surface water (Peach Island Creek) discharge.

**Alternative GW-4:**

- Pumping (either recovery wells or French interceptor drains),
- Biological treatment (sequencing batch reactors),
- Granular activated carbon, and
- Surface water (Peach Island Creek) discharge.

**Alternative GW-5:**

- Pumping (either recovery wells or French interceptor drains),
- Steam stripping (condensate is treated, i.e., incineration or dispose off-site),
- Granular activated carbon,
- Metals precipitation (treatment/disposal of sludge),
- Neutralization, and
- Surface water (Peach Island Creek) discharge.

**Alternative GW-6:**

- Pumping (either recovery wells or French interceptor drains),
- Critical fluid extraction (treatment of extractant),
- Granular activated carbon and/or chemical oxidation,
- Metals precipitation (treatment/disposal of sludge),
- Neutralization, and
- Surface water (Peach Island Creek) discharge.

**Alternative GW-7:**

- Pumping (either recovery wells or French interceptor drains),

- VOC partial removal (chemical oxidation, critical fluid extraction or steam stripping),
- Metals precipitation (treatment/disposal of sludge),
- Discharge (to local POTW) for treatment/disposal.

#### **Contaminated Soil/Sludge**

##### **Alternative S/S-1:**

- No action.

##### **Alternative S/S-2:**

- Dewater fill unit (either recovery wells or French interceptor drains), if necessary,
- Remove for rotary kiln incineration (with off-gas treatment),
- Stabilization/solidification of incinerator ash (backfill treated material on site), and
- Cap (multi-media cap, grading, dikes and berms, revegetation).

##### **Alternative S/S-3:**

- Dewater fill unit (either recovery wells or French interceptor drains),
- In situ vitrification, and
- Cap (multi-media cap, grading, dikes and berms, revegetation).

##### **Alternative S/S-4:**

- Dewater fill unit (either recovery wells or French interceptor drains), if necessary,
- In situ stabilization/solidification, and
- Cap (multi-media cap, grading, dikes and berms, revegetation).

**Alternative S/S-5:**

- Dewater fill unit (either recovery wells or French interceptor drains), if necessary,
- Remove for on-site stabilization/solidification (backfill treated material on site), and
- Cap (multi-media cap, grading, dikes and berms, revegetation).

**Alternative S/S-6:**

- Dewater fill unit (either recovery wells or French interceptor drains),
- Remove for on-site solvent extraction (treatment of extractant solution, backfill treated material on site)
- Cap (multi-media cap, grading, dikes and berms, revegetation).

**Alternative S/S-7:**

- Dewater fill unit (either recovery wells or French interceptor drains),
- Remove for on-site solvent extraction (treatment of extractant solution),
- On-site stabilization/solidification (backfill treated material on site) with addition of ground water if necessary, and
- Cap (multi-media cap, grading, dikes and berms, revegetation).

**Alternative S/S-8:**

- Dewater fill unit (either recovery wells or French interceptor drains),
- Slurry Wall, and
- Cap (multi-media cap, grading, revegetation).

**Alternative S/S-9:**

- Dewater fill unit (either recovery wells or French interceptor drains), if necessary
- Remove PCB-containing sludges for treatment,

- Remove soils/sludges for on-site stabilization/solidification, (if required) and
- Dispose off site (secure landfill).

**Alternative S/S-10:**

- Dewater fill unit (either recovery wells or French interceptor drains), if necessary,
- Remove PCB-containing sludges for treatment,
- Remove soils/sludges for on-site stabilization/solidification, and
- Dispose stabilized soils/sludges in on-site RCRA vault.

This concludes the Interim Status Report on Tasks 1 and 2 of Phase I for the Feasibility Study/First Operable Unit. These potential remedial alternatives, and the order of implementation of the process options within each remedial alternatives, will be described and evaluated in Phase II of the FS/FOU.

**TABLE 1**  
**TECHNOLOGY TYPES AND PROCESS OPTIONS**

- 1. NO ACTION - GENERAL RESPONSE ACTION**
- 2. CONTAINMENT - GENERAL RESPONSE ACTION**
  - a. Capping
    1. Synthetic membrane
    2. Single Layer (asphalt, concrete)
    3. Multi-media
  - b. Containment Barriers
    1. Slurry walls
    2. Grout curtains
    3. Sheet piles
    4. Bottom sealing
- 3. SHALLOW GROUND WATER COLLECTION - GENERAL RESPONSE ACTION**
  - a. Ground water pumping
    1. Extraction wells
    2. Injection wells
  - b. Subsurface drains
    1. French drains
    2. Horizontal drains
- 4. DIVERSION - GENERAL RESPONSE ACTION**
  - a. Grading
  - b. Revegetation
  - c. Surface water controls
    1. Dikes and berms
    2. Channels, ditches, trenches
    3. Terraces and benches

**Table 1 (continued)**

**5. REMOVAL - GENERAL RESPONSE ACTION**

- a. Complete removal
- b. Partial removal
- c. Removal and replacement or relocation of sewer lines

**6. TREATMENT - GENERAL RESPONSE ACTION**

- a. Shallow ground water treatment
  - 1. Biological (Aerobic)
    - (a) Suspended growth (activated sludge, sequencing batch reactors, PACT),
    - (b) Fixed-film growth (fluidized bed, trickling filters, rotating biological contactors)
  - 2. Physical/Chemical treatment
    - (a) Immobilization - precipitation
    - (b) Immobilization - polymerization
    - (c) Neutralization
    - (d) Chemical oxidation
      - (i) Hydrogen peroxide with/without UV photolysis
      - (ii) Ozone with/without UV photolysis
      - (iii) Hydrogen peroxide and Ozone with/without UV Photolysis
    - (e) Dehalogenation
    - (f) Liquid-liquid solvent extraction (Critical fluid extraction (CO<sub>2</sub>))
    - (g) Ion exchange
    - (h) Flocculation, coagulation, sedimentation
    - (i) Granular activated carbon adsorption
    - (j) Steam stripping
    - (k) Air stripping
      - (i) Air stripping with off-gas treatment
      - (ii) Air stripping without off-gas treatment
    - (l) Filtration
    - (m) Electrodialysis
    - (n) Reverse osmosis

**Table 1 (continued)**

- 3. Thermal Destruction
  - (a) Rotary kiln incineration
  - (b) Liquid injection
  - (c) Fluidized-bed incineration
  - (d) Pyrolysis
- 4. Discharge to Local POTW
- b. Sludge/soil treatment
  - 1. Biological treatment
    - (a) Aerobic treatment
    - (b) Anaerobic treatment
    - (c) Bioreclamation
  - 2. Physical/Chemical treatment
    - (a) Contaminant extraction
    - (b) Dehalogenation (Alkali metal/  
polyethylene glycol)
    - (c) Dewatering/thickening
    - (d) Solidification, stabilization, fixation
      - (i) Cement-based solidification (cement  
pozzolan)
      - (ii) Pozzolan-based solidification
    - (e) Immobilization-Chelation
    - (f) In Situ soils washing/soil flushing  
(extraction)
    - (g) Low temperature thermal stripping
    - (h) Vitrification
  - 3. Thermal Destruction
    - (a) Rotary kiln incineration
    - (b) Infrared incineration
    - (c) Fluidized-bed incineration

**7. DISPOSAL**

- a. Disposal of sludge/soil
  - 1. Off-site disposal
    - (a) Secure landfill

**Table 1 (continued)**

2. On-site disposal

- (a) Secure landfill
- (b) Vault



**TABLE 2**  
**INITIAL SCREENING OF TECHNOLOGY TYPES**  
**AND PROCESS OPTIONS**

General Response Action	Technology Type	Process Option	Description	Screening Comments
No action	None	Not applicable	No remedial action; continuous monitoring of ground water only.	Required for consideration by NCP
Containment	Capping	Synthetic membrane	Synthetic membrane covered by soil over areas of contamination	Potentially applicable
		Single layer	Asphalt or concrete slab over areas of contamination	Potentially applicable
		Multi-media	Clay and synthetic membrane covered by soil over areas of contamination	Potentially applicable
	Barriers	Slurry walls	Trench around site (or areas of contamination), filled with cement/bentonite slurry	Potentially applicable
		Grout curtains	Pressure injection of grout in a regular pattern of drilled holes	Potentially applicable
		Sheet piles	Install steel beams next to each other around site (or areas of contamination)	Potentially applicable
		Bottom sealing	Pressure injection of grout at depth through closely drilled holes	Not effective because of non-homogeneous fill material and irregular clay confining layer
Shallow ground water collection	Pumping	Extraction wells	Wells employed to pump ground water for aboveground treatment	Potentially applicable

Table 2 (continued)

General Action	Response Technology Type	Process Option	Description	Screening Comments
Diversion	Subsurface drains	Injection wells	Injection wells inject uncontaminated water to increase flow to extraction wells	Not effective because of the (hydrogeologic) variability of fill material
		French drains	Perforated pipe in trenches backfilled with porous media to collect contaminated ground water and treat on site or collect to treat off site	Potentially applicable
		Horizontal drains	Perforated pipe installed parallel to hydraulic gradient to collect contaminated ground water	Not feasible because of the hydrogeologic conditions of fill material
	Grading	None	Changing existing topography of site to redirect precipitation run-off	Potentially applicable
	Revegetation	None	Mulch and seed site to prevent erosion	Potentially applicable
	Surface controls	Dikes and berms	Compacted earthen ridges or ledges along northern side of site to prevent Peach Island Creek floodwater contact with contaminated media	Potentially applicable
		Channels, ditches and trenches	Excavated ditches to intercept run-off or run-on	Potentially applicable
Removal		Terraces and benches	Topographic modifications designed to divert flow and control erosion by slowing run-off velocity	Not effective because of the flat topography of site
	Complete	None	Excavation of on-site contaminated fill soil and/or sludge	Potentially applicable
	Partial	None	Excavation of on-site contaminated fill soils and sludge hot spots	Potentially applicable

Table 2 (continued)

General Response Action	Technology Type	Process Option	Description	Screening Comments
	Removal and replacement, relocation or relining of sewer lines	None	Remove and replace or relocate cracked sewer lines along perimeter of site to reduce ground water infiltration into sewers	Potentially applicable
Treatment - shallow ground water	Biological	Suspended growth (activated sludge, sequencing batch reactors PACT)	Aerobic degradation of organics using suspended microorganisms in a completely mixed reactor with or without the addition of powdered carbon	Potentially applicable
		Fixed-film growth (fluidized bed, trickling filter, RBC)	Aerobic degradation of organics using microorganisms attached on a fixed medium	Potentially applicable
	Physical/ chemical	Immobilization - precipitation	Chemical equilibrium of ground water is changed to reduce constituent(s) solubility, promoting precipitation of contaminants out of ground water	Potentially applicable
		Immobilization - polymerization	Injection of a catalyst into ground water to convert an organic monomer into a larger chemical multiple of itself with different properties. Transforms a fluid-like substance into a gel-like, nonmobile mass	Not effective because of ground water composition
		Neutralization	Introducing dilute acids and bases into ground water to bring the pH to 7	Potentially applicable
		Chemical oxidation	Mixing ground water with hydrogen peroxide and/or ozone with or without ultraviolet light.	Potentially applicable

Table 2 (continued)

General Response Technology Action	Technology Type	Process Option	Description	Screening Comments
		Dehalogenation	Using chemical reagents to remove the chlorine atoms (by substitution) from chlorinated compounds in the ground water, resulting in less harmful chemical compound	Potentially applicable
		Critical fluid extraction (carbon dioxide)	Extraction of contaminants from ground water using liquified carbon dioxide under high pressure (at its critical point)	Potentially applicable
		Ion exchange	Contaminated ground water is passed through a resin bed where ions are exchanged between resin and ground water	Not effective on many of the organics present in the ground water
		Flocculation, coagulation, sedimentation	Particulates in contaminated ground water are allowed to agglomerate and settle out of ground water	Potentially applicable
		Granular Activated Carbon adsorption	Adsorption of contaminants onto activated carbon by passing water through carbon column	Potentially applicable
		Steam stripping	A continuous fractional distillation process (using steam) to remove contaminants in packed or tray tower	Potentially applicable
		Air stripping (with or without off-gas treatment)	Passing large volumes of air through water in a packed column to promote transfer of VOCs to air. Off-gas treatment by flame incineration and vapor phase carbon	Not effective on many of the organics present in the ground water
		Filtration	Separating solids (particulates) from ground water using porous materials in a filter bed	Potentially applicable

Table 2 (continued)

General Action	Response Technology Type	Process Option	Description	Screening Comments
	Thermal Destruction	Electrodialysis	Separating ions in ground water by applying an electrical current to the water which causes ions to move through dialysis membrane	Not applicable for organics present in the ground water
		Reverse osmosis	Use of high pressure to force water through a membrane leaving contaminants behind	Contaminant concentration too low for treatment
		Rotary kiln incineration	Combustion in a horizontally rotating cylinder designed for uniform heat transfer	Potentially applicable
		Liquid injection	Introduction directly into a flame for combustion	Potentially applicable
		Fluidized bed incineration	Waste injected into a hot agitated bed of sand where combustion occurs	Potentially applicable
		Pyrolysis	Thermal decomposition of contaminants in the absence of oxygen	Potentially applicable
	Off-site	Local POTW	Extract and discharge contaminated or partially treated ground water to local POTW for treatment/disposal	Potentially applicable
Treatment - Sludge/ Soils	Biological	Aerobic	Degradation of organics using micro-organisms in an aerobic environment	Not effective to treat inorganics
		Anaerobic	Degradation of organics using micro-organisms in an anaerobic environment	Not effective to treat inorganics
		Bioreclamation	Utilize microorganisms to degrade organic constituents in the soil either aerobically or anaerobically	Not applicable to inorganics in soil

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Table 2 (continued)

General Response Action	Technology Type	Process Option	Description	Screening Comments
	Physical/chemical	Contaminant extraction	Contamination is removed by extraction with liquid solvents with or without special additive chemicals	Potentially applicable
		Dehalogenation	Removal of halogen atoms (by substitution) from organic compounds via chemical reagents	Potentially applicable
		Dewatering/thickening	Reducing water content of sludge via centrifugation, gravity thickening, or filtration	Not feasible due to soil/sludge characteristics
		Cementitious solidification/stabilization	Mixing with alkaline reagents to produce a rigid matrix	Potentially applicable
		Pozzolanic solidification/stabilization	Mixing with fine silicates (i.e. pozzolans) and alkaline reagents to produce a rigid matrix	Potentially applicable
		Immobilization - chelation	Immobilization of metal ions through the use of organic ligands	Not applicable because of chemical interference from contaminants in soil
	Physical	In situ soil washing/flushing	Sorbed soil contaminants are mobilized into extractant solution which is recycled	Potentially applicable
		Air stripping	Aeration via physical methods release volatile contaminants	Not effective for inorganic and non volatile contaminants
		Solidification/stabilization	See "Treatment - sludge, physical" above	Potentially applicable

Table 2 (continued)

General Response Action	Type	Process Option	Description	Screening Comments
	Thermal Destruction	Low temperature thermal stripping	Heats soil at low temperatures (i.e., 300°F), mobilizing VOCs into off gas for further treatment by incineration or carbon adsorption	Not applicable to all organics at the site
		Vitrification	Uses electric current to melt contaminated soils and destroy contaminants, leaving behind a solid block of inert material	Potentially applicable
		Rotary kiln incineration	Combustion in a horizontally rotating cylinder designed for uniform heat transfer	Potentially applicable
		Infrared incineration	Uses pyrolysis and subsequent oxidation fueled by infrared energy to destroy contaminants	Potentially applicable
		Fluidized-bed incineration	Waste injected into hot agitated bed of sand where combustion occurs	Not applicable due to expected process problems with solids
Disposal-sludge/soils	Off-site	Landfill	Excavate contaminated soil/sludge to approved landfill	Potentially applicable
	On-site	Landfill	Excavate contaminated soil/sludge to on-site landfill	Site hydrogeology unsuitable for hazardous waste landfill
		Vault	Excavate contaminated soil/sludge to on-site vault (excluding PCB-contaminated waste)	Potentially applicable

**TABLE 3**  
**DETAILED SCREENING OF PROCESS OPTIONS**  
**SCP SITE**

GENERAL RESPONSE ACTION	TECHNOLOGY TYPE	PROCESS OPTIONS	SCREENING CRITERIA			RETAIN
			EFFECTIVENESS	IMPLEMENTATION	COST	
No action	None	Not applicable	Does not achieve remedial action objectives	Not appropriate to local/public government	None	Yes*
Containment	Capping	Synthetic membrane	Effective but susceptible to puncturing	Easily implemented, restrictions on future land use	Low capital Moderate maintenance	No
		Single layer	Effective but susceptible to weathering and cracking	Easily implemented, restrictions on future land use	Low to moderate capital High maintenance	No
		Multi-media	Effective, least susceptible to cracking and puncturing	Easily implemented, restrictions on future land use	Moderate to high capital. Moderate maintenance	Yes
	Barriers	Slurry walls	Effective, least susceptible to allowing ground water infiltration through barrier	Readily implemented	Moderate capital Low maintenance	Yes
		Grout curtains	Effective, susceptible to allowing ground water infiltration through barrier due to inconsistent barrier thickness	Readily implemented	Moderate capital Moderate maintenance	No
		Sheet piles	Effective, highly susceptible to allowing ground water infiltration through barrier	Readily implemented	Moderate capital Low maintenance	No
Shallow Ground Water Collection	Pumping	Extraction wells	Effective and reliable	Readily implemented	Moderate capital Low O&M	Yes
	Subsurface drains	French drains	Effective and reliable	Readily implemented	Moderate capital Low O&M	Yes

\*No Action retained for baseline comparison



TABLE 3 con't  
DETAILED SCREENING OF PROCESS OPTIONS  
SCP SITE

GENERAL RESPONSE ACTION	TECHNOLOGY TYPE	PROCESS OPTIONS	SCREENING CRITERIA			RETAIN
			EFFECTIVENESS	IMPLEMENTATION	COST	
Diversion	Grading	None	Effective for controlling pre- cipitation run-on and run-off and erosion over site	Easily implemented along with other remedial technologies	Low capital, Low O&M	Yes
	Revegetation	None	Effective for controlling erosion over site	Easily implemented along with other remedial technologies	Low capital, Low O&M	Yes
	Surface water control	Dikes and berms	Effective in preventing flood waters from contacting contaminated soil/sludge	Readily implemented, permit required	Moderate capital, Moderate maintenance	Yes
		Channels, ditches and trenches	Effective, but susceptible to clogging	Easily implemented	Low capital, High maintenance	No
Removal	Complete	None	Effective and reliable. Required for treatment and disposal options	Nearest RCRA facility miles away. Permit required	Very high capital, Low O&M	Yes
	Partial	None	Effective and reliable. Required for treatment and disposal options	Nearest RCRA facility miles away. Permit required	High capital, Low O&M	Yes
	Removal and replacement, relocation, or relining of sewer lines	None	Effective and reliable	Requires local government approval, permit required	High capital, Low O&M	Yes

**TABLE 3 con't**  
**DETAILED SCREENING OF PROCESS OPTIONS**  
**SCP SITE**

GENERAL RESPONSE ACTION	TECHNOLOGY TYPE	PROCESS OPTIONS	SCREENING CRITERIA			RETAIN
			EFFECTIVENESS	IMPLEMENTATION	COST	
Treatment - Shallow Groundwater	Biological	Suspended growth	Effective, least susceptible to upsets due to inhibitory compounds	Readily implemented	High capital, Moderate O&M	Yes
		Fixed-film growth	Requires sludge treatment and disposal. Pilot test required to determine reliability and effectiveness.	Readily implemented	High capital, moderate O & M	No
	Physical/ chemical	Immobilization-precipitation	Effective and reliable conventional technology. Requires sludge treatment and disposal.	Readily implemented	Moderate capital, Moderate O&M	Yes
		Neutralization	Effective and reliable	Readily implemented	Low capital, Low O&M	Yes
		Chemical oxidation	Effective and reliable	Readily implemented	Moderate capital, Moderate O&M	Yes
		Dehalogenation	Effective, pretreatment would be required	Readily implemented	Moderate capital, Moderate O&M	No
		Critical fluid extraction	Pilot test required to determine effectiveness and reliability	Readily implemented	High capital, Moderate O&M	Yes
		Granular activated carbon	Pilot test required to determine effectiveness and reliability	Readily implemented	Moderate capital, High O&M	Yes
		Steam stripping	Pilot test required to determine effectiveness and reliability of decant solution to be treated and/or disposed.	Readily implemented	High capital, Moderate O&M	Yes

TABLE 3 con't  
DETAILED SCREENING OF PROCESS OPTIONS  
SCP SITE

GENERAL RESPONSE ACTION	TECHNOLOGY TYPE	PROCESS OPTIONS	SCREENING CRITERIA			RETAIN
			EFFECTIVENESS	IMPLEMENTATION	COST	
	Thermal destruction	Rotary kiln	Trial burn required to determine effectiveness and reliability to thermal shock.	Easily implemented, permit required. Difficulties in siting due to public opposition	High capital, High O&M	No
		Liquid injection	Trial burn required to determine effectiveness and reliability	Easily implemented, permit required.	High capital, High O&M	No
		Fluidized bed	Trial burn required to determine effectiveness and reliability. Waste may require pretreatment.	Easily implemented, permit required.	High capital, High O&M	No
		Pyrolysis	Effective but susceptible to upsets in continuous flow mode.	Readily implemented	Moderate capital, High O&M	No
	Local POTW	None	Effectiveness and reliability requires POTW acceptance standards to determine	Local POTW miles away. Permit required	High capital, Moderate O&M	Yes
Treatment- Sludge/Soil	Physical/ Chemical	Solvent Extraction	Effective and reliable, proper pretreatment required. Pilot study required to assess feasibility.	Readily implemented	Moderate capital, High O&M	Yes
		Dehalogenation	Effective, proper pretreatment required, pilot study required. Requires extraction treatment.	Readily implemented	Moderate capital, High O&M	No
		Cementitious solidification/stabilization	Effective, susceptible to leaching of organic constituents. Pilot study required to assess reliability and effectiveness.	Easily implemented	Moderate capital, Very low O&M	Yes

TABLE 3 con't  
DETAILED SCREENING OF PROCESS OPTIONS  
SCP SITE

GENERAL RESPONSE ACTION	TECHNOLOGY TYPE	PROCESS OPTIONS	SCREENING CRITERIA			RETAIN
			EFFECTIVENESS	IMPLEMENTATION	COST	
	Thermal Destruction	Pozzolan based solidification/ stabilization	Effective, least susceptible to leaching of organic constituents. Pilot study required to assess reliability and effectiveness.	Easily implemented	Moderate capital, Very low O&M	Yes
		In situ Soil washing/ flushing	Effective but not reliable due to nonhomogeneity of soil/sludge.	Readily implemented	Low capital, Moderate O&M	No
		Vitrification	Effectiveness and reliability requires pilot test to determine. Requires treatment of off-gas scrubber wash down water.	Readily implemented	High capital, Moderate O&M	Yes
		Rotary kiln	Effectiveness and reliability requires test burn to determine. Requires treatment of ash or slag due to heavy metals.	Readily implemented	Very high capital, High O&M	Yes
		Infrared	Effectiveness and reliability requires test burn to determine. Requires treatment of slag due to heavy metals. Pretreatment may be required.	Readily implemented, Permit required	Very high capital, High O&M	No

TABLE 3 con't  
DETAILED SCREENING OF PROCESS OPTIONS  
SCP SITE

GENERAL RESPONSE ACTION	TECHNOLOGY TYPE	PROCESS OPTIONS	SCREENING CRITERIA			RETAIN
			EFFECTIVENESS	IMPLEMENTATION	COST	
Disposal- sludge/soil	Off-site	Landfill	Effectiveness and reliability requires pilot test to determine. Transportation required (Manifest compliance).	Readily implemented Permit required	High capital, low O & M	Yes
	On-site	Vault	Effective and reliable	Only non-PCB contaminated wastes. Permit required	High capital, low O&M	Yes